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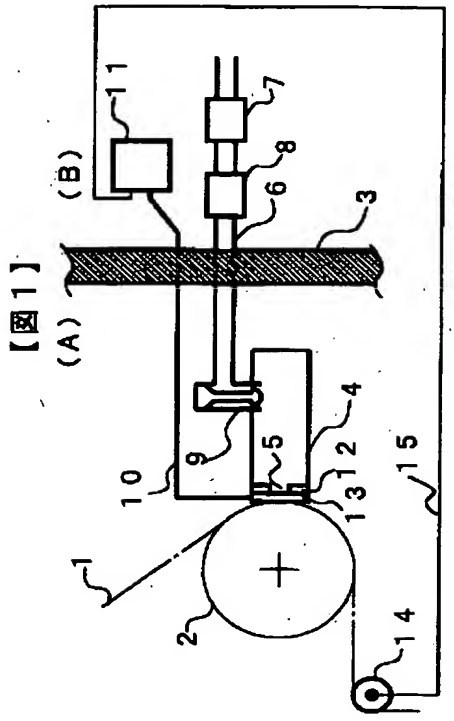
DA00 FA01
4K029 AA02 AA11 AA25 BA62 BB02
BC02 CA01 DB06 DB12

(54)【発明の名称】　蒸着方法

(57)【要約】
【課題】有機化合物等の蒸着物質を、高分子フィルム等の基材に再蒸発を押さえ効率よく付着させることが可能な蒸着方法を提供する。
【解決手段】蒸発した有機化合物が通過する電極板に電圧を印加することによって有機化合物の蒸気を帯電せしめ、さらに電極板と基材間にかけられた電圧によって形成された電界によって基材上に誘導し、基材上に静電気力で蒸気を付着せしめる。

【図１】



【特許請求の範囲】

【請求項１】　蒸着物質を蒸発器の開口部を通して基材に蒸着する際、該蒸発器の開口部と基材の間に電圧を印加し、蒸着することを特徴とする蒸着方法。

【請求項２】　加熱した蒸発器内にて蒸発せしめた蒸着物質を用いることを特徴とする請求項１記載の蒸着方法。

【請求項３】　蒸発器の開口部が多孔構造または網状構造であることを特徴とする請求項１または２記載の蒸着方法。

【請求項４】　蒸着物質が有機化合物である請求項１～３のいずれかに記載の蒸着方法。

【請求項５】　蒸着を真空下で行い、かつ有機化合物の沸点が分解温度以下となる真空度にて蒸着することを特徴とする請求項４記載の蒸着方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、蒸着方法に関するものであり、特に有機化合物を基材に真空蒸着するために好ましく用いられる蒸着方法に関するものである。

【０００２】

【従来の技術】従来から、金属蒸着フイルムの蒸着金属膜の表面に有機化合物の蒸着薄膜を形成することによって、金属蒸着フイルムの耐擦過性を向上させるなどの品質改良を図ったり、あるいは透明導電性蒸着フイルムの表面にエレクトロルミネッセンスなどの機能をもつ有機化合物蒸着膜を設けることによって、エレクトロルミネッセンス膜を製造する方法が知られている。

【０００３】これらの多くは容器内に有機化合物を入れ、容器を加熱して有機化合物を蒸気化する方法により蒸着を行っている。しかしこのような方法においては、有機化合物の熱伝導率が小さいため、有機化合物の表面より容器と接触している界面の方が温度が高くなり、突沸を起こす。また、有機化合物が分解したり、有機化合物が熱重合するものであると重合が進むなどの問題があり、安定して蒸着できない。さらに、有機化合物としてオリゴマーを用いる場合、通常、このようなオリゴマーは重合度の異なる低分子の混合物であり、重合度により沸点が異なるため、蒸発量が時間と共に変化し、均一に蒸着層を形成できないという問題がある。また、有機化合物の混合物を蒸着する際、１つの熱源では沸点の低い方の有機化合物しか蒸発せず、２つ以上の蒸発源が必要となるなどの問題がある。

【０００４】このような問題を解決する斬新な方法が特表昭６３－５０３５５２号公報に提案されており、その具体的な方法が特公平７－２２７２７号公報に記載されている。すなわち、有機化合物を超音波を用いて霧状化し、霧状化した有機化合物を加熱面に接触させることで、一瞬にして有機化合物を蒸発させる方法であり、該方法によれば有機化合物は突沸、分解や重合などを起こす前に蒸発するため、安定して蒸着を行うことができる。さらに沸点の異なる有機化合物の混合物も組成を変化させることなく蒸着できる。

【０００５】

【発明が解決しようとする課題】しかしながら、上記方法では蒸発した蒸着物質が装置内に拡散すると共に、基材に付着した蒸着物質が再蒸発し、基材以外の装置内壁、装置内の部品に付着し、蒸発物質の皮膜を形成して、装置内を汚染すること、装置内に付着した蒸着物質は装置内の駆動系の安定した動きを阻害したり、ひどい場合は動きを止めること、さらには、掃除に時間がかかり生産性を悪化させるなどの重大な問題を引き起こす等の課題があった。

【０００６】そこで本発明は、上記のような課題を解決するとともに、特に、蒸着物質の大部分が基材に付着することが可能な蒸着方法を提供することをその目的とするものである。

【０００７】

【課題を解決するための手段】上記した目的を達成するために、本発明は次の構成からなる。すなわち、本発明の蒸着方法は、蒸着物質を蒸発器の開口部を通して基材に蒸着する際、該蒸発器の開口部と基材の間に電圧を印加し、蒸着する蒸着方法である。特に、加熱した蒸発器内にて蒸発せしめた蒸着物質を用いること、蒸発器の開口部が多孔構造または網状構造であること、蒸着物質を有機化合物とすること、蒸着を真空下で行うと共に、そのときの真空度における有機化合物の沸点が、分解温度以下となる真空度にて蒸着することが好ましい。なお、本発明で言う沸点とは、蒸着物質の蒸気圧が蒸着装置内の圧力と同じになる温度を指す。

【０００８】

【発明の実施の形態】本発明の蒸着方法は、蒸着物質を蒸発器の開口部を通して基材に蒸着する際、蒸発器と基材との間に電圧を印加し蒸着する方法である。

【０００９】通常、物質、特に、水、あるいは有機化合物は金属に比べ蒸発潜熱が小さいため一度に多量の物質が蒸発し、蒸発近傍の圧力が高くなり蒸着物質が煙のようになって蒸着機内全空間に拡散する。それに対し本発明では、蒸発器開口部と基材間に電圧を加電し、開口部を通る蒸発物質の蒸気を帯電させ、その帯電蒸発物質の蒸気を基材へ静電気力によって引きつけるようにしため、蒸発物質の蒸気が蒸着機内全空間に拡散することがない。

【００１０】本発明において用いられる蒸着物質は特に限定されないが、水、有機化合物、もしくは水と有機化合物の混合物等が挙げられる。具体的には、水、アルコール、あるいはアクリル酸、メタクリル酸、アクリル酸エステル、メタクリル酸エステル、ビニルピロリドンなどのビニル化合物、リノール酸、リノール酸エステルなどの不飽和脂肪酸、不飽和脂肪酸エステルあるいはこれ

らを含む油などの加熱によって重合する有機化合物等が挙げられ、有機化合物が特に好ましい。さらに沸点の異なる２種以上の有機化合物の混合物も好ましく用いられる。

【００１１】蒸発物質は、例えば加熱した蒸発器内で蒸発させ蒸気化することができるし、また蒸気化した蒸気を蒸発器に持ち込むこともできるが、蒸発器で蒸発した方が装置が簡素化でき、より好ましい。

【００１２】本発明の蒸発器には、開口部が設けられており、この開口部を通して蒸着物質の蒸気が基材側に向かって送り出されるが、この開口部は、多数の小孔もしくは微細孔からなる多孔構造あるいは網状構造で構成されていることが好ましい。

【００１３】また、本発明において、真空下で蒸着を行う場合は、有機化合物の沸点が分解温度以下となる真空度にて蒸着することが好ましく、さらに２０℃における蒸気圧が１．３×10^{2}Ｐａ以下で、かつ２００℃における蒸気圧が１．３×10^{-2}Ｐａ以上であることがより好ましい。これらの圧力域ではアルミニウムなどの金属を同じ真空装置内で蒸着できる利点がある。

【００１４】また、本発明において用いられる基材は、導電性、あるいは半導電性であれば良く特に限定されるものではなく、具体的にガラス、ポリエチレンテレフタレート等のポリエステルフイルム、ポリプロピレンフイルム、ポリアミドフイルム等の高分子フイルム、あるいはポリメチルメタクリレート等の高分子からなる板状物などに金属、または／および金属酸化物を蒸着したもの、あるいは金属箔等を代表的な例として挙げることができる。

【００１５】本発明では、まず真空蒸着機内において高分子フイルムに金属を蒸着し、次いで該真空蒸着機内で該蒸着フイルムを基材として、蒸発物質を蒸着することが特に好ましい。

【００１６】例えば、ポリエステルフイルム、あるいはポリプロピレンフイルムにアルミニウムを蒸着した金属蒸着フイルムを基材として用い、蒸着金属膜の表面に不飽和脂肪酸、不飽和脂肪酸エステル、あるいはこれらを含む油等を蒸着した後、該有機化合物を重合させることで、ガスバリア性および耐擦過性を向上させることができる。

【００１７】以下、図を用いて本発明をより詳細に説明するが、本発明はこれらに限定されるものではない。

【００１８】図１は、本発明を実施するために好適な装置の一例を説明するためのの概略図であるが、本発明は本装置に限定されるものではない。この装置は、真空壁３と、開口部５を有する蒸発器４と、有機化合物配送管６と、定量ポンプ７と、開閉バルブ８と、超音波振動子が組み込まれた噴霧管９と、電圧を印加するための導線１０、１５と、電源１１と、基材１に電圧を印加するための金属ロール１４とで基本的に構成されている。さらに開口部５は多数の微細孔、あるいは網状構造を持った金属製の電極板１３と、該電極板１３と蒸発器４を電気的に絶縁する絶縁板１２と、蒸発器４に設けられた狭い開口口とからなっている。電極板１３と金属ロール１４は各々導線１０、１５によって電源１１と結線され、電極板１３と金属ロール１４との間に電圧が印加されている。

【００１９】真空壁３の真空側（Ａ）側は、真空に保持されており、冷却ドラム２上を基材１が走行している。基材１表層の金属蒸着膜には、基材１が金属ロール１４に接触することによって電源１１より電圧が印加されている。なお、真空壁３の大気側（Ｂ）側は大気に曝された状態である。

【００２０】有機化合物は脱気され、保管されている有機化合物供給曹（図示せず）から有機化合物配送管６を通じて、真空を保持できる定量ポンプ７により規定量が開閉バルブ８をへて噴霧管９に送り込まれる。噴霧管９には超音波振動子が組み込まれており、噴霧管内の振動子（ホーン）に触れた有機化合物は振動子の超音波振動によって霧状になって高温に保持された蒸発器４の内壁へと噴霧される（図１では超音波電源、および超音波振動発生装置は図示せず。超音波振動子の詳細は図示せず。）。噴霧された有機化合物は、加熱された蒸発器４の内壁に衝突すると同時に蒸発し、蒸発器４の先端の開口部５を通って蒸着機内空間に放出される。このとき、開口部５の電極板１３と基材１に電圧が加電されているため有機化合物の蒸気が帯電し、さらに開口部５と基材１間の電界に導かれ、基材１の表面に静電気力よって付着する。基材１は冷却ドラム２によって冷却されているため、基材１に付着した有機化合物は容易に凝集し、基材１の表面に有機化合物の薄膜が形成される。また基材１に付着した有機化合物は、基材１と静電気力で付着しているため、付着した有機化合物が再蒸発する確率は低い。

【００２１】なお、電圧は蒸発器４に直接印加することもできる。このときは蒸発器４の開口口に多数の微細孔を設けるか、網状構造などにすることが好ましい。

【００２２】電源１１から供給する電圧、電流は直流、交流、および直流を重畳した交流のいずれであってもよいが、一般に有機化合物は誘電性であるため、直流を重畳した交流が好ましい。電極１０にかける電圧の極性は開口部５に対し正負どちらでもよく、電圧は、真空度および基材１と蒸発器４との距離に依存するが、ピーク電圧で５０Ｖから１０ＫＶ程度が好ましい。５０Ｖ未満では有機化合物蒸気が帯びる帯電量が少なく、有機化合物の蒸気が基材１以外に蒸着機内空間に拡散しやすくなる。また１０ＫＶを越えると基材１あるいは蒸着機内の金属部品と開口部５、または金属ロール１４の間でアーク放電が起きやすくなり、有機化合物の付着状態が不安定になる。より好ましい電圧は１００Ｖから３ＫＶであ

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る。

【００２３】蒸発器４の温度は、内壁、言い換えれば内側のすべての面が、蒸発器４内の圧力以上に蒸着物質の蒸気圧がなる温度以上に加熱されていればよい。

【００２４】さらに本発明を用いて有機化合物を基材表面に蒸着した後、蒸着された有機化合物蒸着層に電子線などの放射線を照射、あるいは低温プラズマで処理するなどして有機化合物の反応、あるいは重合を促進することによって、より好ましい特性を基材に付与することができる。

【００２５】

【実施例】コロナ放電処理を行った厚み１８μｍの二次延伸ポリプロピレンフイルムに、５×１０$^{-3}$Paに排気した真空蒸着機内で、まずアルミニウムを吸光度ＯＤ２．３になるように蒸着した後、ついで図１の装置を用い、２００℃に加熱した蒸発器の中に噴霧器にて霧状にしたキリ油とリノレン酸の混合油（リノレン酸含有量：２０w/w%）を供給し、蒸発した混合油を蒸発器に設けられた開口部を通し、アルミニウム蒸着膜上に蒸着した。開口部の電極板は直径１ｍｍの小孔を２５個／ｃｍ^{2}を有し、かつアルミニウム蒸着フイルムのアルミニウム蒸着膜と接触するよう配置された金属ロールとの間に、直流５００ｖにピーク電圧３００ｖ、周波数１０ｋＨｚの交流を重畳した電圧を印可した。

【００２６】次いで、内部にＡｒガスと酸素ガスの混合ガス（酸素ガス濃度：４０mol/mol%）を供給した箱形の接地電極の内部に接地電極から絶縁し、設置された高電圧電極に、ピーク電圧６００Ｖの高周波電圧を印加して接地電極内にグロー放電（プラズマ）を形成し、接地電極に設けられたスリットを通して、プラズマの一部を導き出し、アルミニウム蒸着膜上の混合油層に照射し、混合油層を架橋せしめた。本操作を蒸着速度５００ｍ／ｍｉｎで２１０００ｍのポリプロピレンフイルムに行った。

【００２７】アルミニウム蒸着膜上の架橋した混合油からなる高分子樹脂層の膜厚から基材上に有効に付着した混合油量を計算した結果、電圧を印加しなかった場合は蒸発せしめた混合油量に対する付着量は５２％であった

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のに対し、電圧を印加した場合は９８％まで向上した。また、電圧を印加しなかった場合は、蒸発器近傍の蒸着機内の部品に薄い樹脂皮膜が形成されたのに対し、電圧を印加した場合はそのような樹脂皮膜の形成は見られなかった。

【００２８】

【発明の効果】本発明は、有機化合物等の蒸着物質が通過する電極板と基材間に電圧を印加し、基材上に該蒸発物質を蒸着させる方法である。蒸発した蒸着物質が通過する電極板に電圧を印加することによって蒸着物質の蒸気が帯電し、さらに電極板と基材間にかけられた電圧によって形成された電界に誘導され基材上に高い比率で蒸着物質の蒸気が付着する。

【００２９】さらに本発明においては、蒸着物質の蒸気は、基材と静電気力で付着しているため再蒸発する確率が低い。

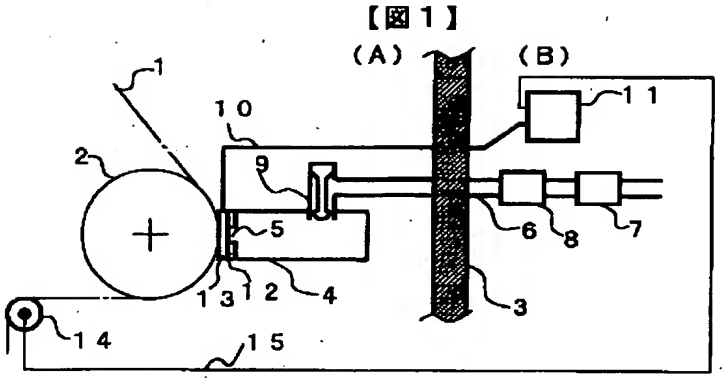
【図面の簡単な説明】

【図１】　本発明を実施するための１装置例を説明するための概略図である。

【符号の説明】

１：基材
２：冷却ドラム
３：真空壁
４：蒸発器
５：開口部
６：有機化合物配送管
７：定量ポンプ
８：開閉バルブ
９：噴霧管
１０：導線
１１：電源
１２：絶縁板
１３：電極板
１４：金属ロール
１５：導線
（Ａ）：真空側
（Ｂ）：大気側

【図１】



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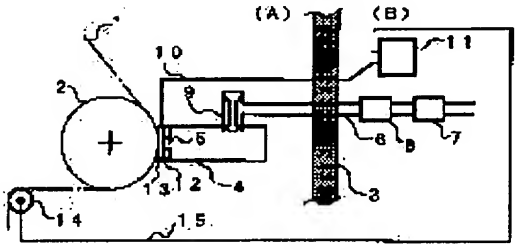
(54) VAPOR DEPOSITION METHOD

(57)Abstract:
PROBLEM TO BE SOLVED: To realize the efficient vapor deposition by depositing most of vapor deposited substance on a base material by feeding the vapor deposited substance obtained by heating and evaporating an organic compound, etc., in a vacuum evaporator from an opening part of the evaporator, and guiding the vapor deposited substance onto the base material by the electric field formed by applying the voltage between the opening part and the base material.
SOLUTION: An organic compound is fed to a vacuum side (A) of a vacuum wall 3 through a fixed delivery pump 7, a control valve 8, and an organic compound delivery pipe 6, atomized by an ultrasonic oscillator in an atomizing tube 9, and introduced in an evaporator 4. This organic compound is brought into contact with an inner wall of the hot evaporator, and its temperature rises, and the compound is easily evaporated at the temperature not higher than the decomposition point. The generated vapor deposited substance is fed from an opening part 5 of preferably porous structure or network structure of the evaporator 4 toward a base material 1 such as a metal film carried above a cooling drum 2. The voltage is applied between the base material 1 and the opening part 5 from a power source 11 through an electrode plate 13 and a metal roll 14, the vapor deposited substance is charged, and at the same time, the electric field is formed between the base material and the opening part.



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CLAIMS

[Claim(s)]
[Claim 1] The vacuum evaporationo approach characterized by impressing and vapor-depositing an electrical potential difference between opening of this evaporator, and a base material in case the vacuum evaporationo matter is vapor-deposited to a base material through opening of an evaporator.
[Claim 2] The vacuum evaporationo approach according to claim 1 characterized by using the vacuum evaporationo matter made to evaporate within the heated evaporator.
[Claim 3] The vacuum evaporationo approach according to claim 1 or 2 characterized by opening of an evaporator being porous structure or network structure.
[Claim 4] The vacuum evaporationo approach according to claim 1 to 3 that the vacuum evaporationo matter is an organic compound.
[Claim 5] The vacuum evaporationo approach according to claim 4 characterized by vapor-depositing with the degree of vacuum which it vapor-deposits under a vacuum and the boiling point of an organic compound becomes below decomposition temperature.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] About the vacuum evaporationo approach, this invention relates to the vacuum evaporationo approach used preferably, in order to carry out vacuum deposition especially of the organic compound to a base material.
[0002]
[Description of the Prior Art] The method of manufacturing the electroluminescence film from the former by aiming at quality improvement of raising the scratch-proof nature of a metal vacuum evaporationo film by forming the vacuum evaporationo thin film of an organic compound in the front face of the vacuum evaporationo metal membrane of a metal vacuum evaporationo film, or preparing the organic compound vacuum evaporationo film which has functions, such as electroluminescence, in the front face of a transparent conductive vacuum evaporationo film is learned.
[0003] These many put in an organic compound in a container, and are vapor-depositing by the approach of heating a container and steam-izing an organic compound. However, in such an approach, since the thermal conductivity of an organic compound is small, temperature becomes high and the direction of the interface which touches the container from the front face of an organic compound causes bumping. Moreover, an organic compound cannot decompose, or there are problems, like a polymerization progresses that it is that in which an organic compound carries out thermal polymerization, and they cannot stabilize and vapor-deposit. Furthermore, when using oligomer as an organic compound, such oligomer is low-molecular mixture with which polymerization degree differs, and since the boiling point changes with polymerization degree, evaporation changes with time amount and it usually has the problem that a vacuum evaporationo layer cannot be formed in homogeneity. Moreover, in case the mixture of an organic compound is vapor-deposited, in one heat source, only an organic compound with the lower boiling point evaporates, but there are problems, like two or more evaporation sources are needed.
[0004] The new approach of solving such a problem is proposed by the Patent Publication Showa No. 503552 [63 to] official report, and the concrete approach is indicated by JP,7-22727,B. Namely, and by contacting the organic compound [-izing / the organic compound / the shape of a fog] to a heating surface, it is the approach of evaporating an organic compound in an instant, and according to this approach, since an organic compound evaporates before causing bumping, decomposition, a polymerization, etc., it can be vapor-deposited by being stabilized. [an organic compound] [using a supersonic wave] [fog] [**] It can vapor-deposit without the mixture of the organic compound with which the boiling points furthermore differ also changing a presentation.
[0005]
[Problem(s) to be Solved by the Invention] However, while the vacuum evaporationo matter which evaporated by the above-mentioned approach is spread in equipment The vacuum evaporationo matter adhering to a base material re-evaporates, adhere to equipment walls other than a base material, and the components in equipment, and the coat of the evaporation matter is formed. The vacuum evaporationo matter which adhered in polluting the inside of equipment and equipment checked the motion by which the drive system in equipment was stabilized, and when severe, further, cleaning took time amount and technical problems, such as causing stopping a motion and the serious problem of worsening productivity, occurred.
[0006] Then, this invention sets it as the purpose to offer the vacuum evaporationo approach which can be especially adhered to a base material by most vacuum evaporationo matter while it solves the above technical problems.

[0007]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, this invention consists of the next configuration. That is, in case the vacuum evaporationo approach of this invention vapor-deposits the vacuum evaporationo matter to a base material through opening of an evaporator, it impresses an electrical potential difference between opening of this evaporator, and a base material, and is the vacuum evaporationo approach to vapor-deposit. While performing under a vacuum using the vacuum evaporationo matter made to evaporate within the evaporator heated especially, that opening of an evaporator is porous structure or network structure, using the vacuum evaporationo matter as an organic compound, and vacuum evaporationo, it is desirable to vapor-deposit with the degree of vacuum which the boiling point of the organic compound in the degree of vacuum at that time becomes below decomposition temperature. In addition, the boiling point said by this invention points out the temperature to which the vapor pressure of the vacuum evaporationo matter becomes the same as the pressure in vacuum evaporationo equipment.
[0008]
[Embodiment of the Invention] In case the vacuum evaporationo approach of this invention vapor-deposits the vacuum evaporationo matter to a base material through opening of an evaporator, it is the approach of impressing and vapor-depositing an electrical potential difference between an evaporator and a base material.
[0009] Usually, since the latent heat of vaporization is small compared with a metal, a lot of matter evaporates at once, the pressure near the evaporation becomes high, the vacuum evaporationo matter becomes like smoke, and the matter especially water, or an organic compound is diffused in the vacuum evaporationo inside-of-a-plane whole space. To it, in this invention, an electrical potential difference is **** (ed) between evaporator opening and a base material, the steam of the evaporation matter which passes along opening is electrified, according to electrostatic force, the steam of the electrification evaporation matter is drawn to a base material, and is accumulated to it, and the steam of the evaporation matter does not diffuse in the vacuum evaporationo inside-of-a-plane whole space.
[0010] Although especially the vacuum evaporationo matter used in this invention is not limited, the mixture of water, an organic compound, or a water and an organic compound etc. is mentioned. The organic compound which specifically carries out a polymerization with heating of the oil containing unsaturated fatty acid, such as vinyl compounds, such as water, alcohol or an acrylic acid, a methacrylic acid, acrylic ester, methacrylic ester, and vinyl pyrrolidone, linolic acid, and linoleic ester, unsaturated fatty acid ester, or these etc. is mentioned, and especially an organic compound is desirable. The mixture of two or more sorts of organic compounds with which the boiling points furthermore differ is also used preferably.
[0011] Although the evaporation matter can also carry into an evaporator the steam which was evaporated within the evaporator heated, for example, and could steam-ize, and was steam-ized, the direction which evaporated with the evaporator can simplify equipment and is more desirable.
[0012] Although opening is prepared in the evaporator of this invention and the steam of the vacuum evaporationo matter is sent out to it toward a base material side through this opening, as for this opening, it is desirable to consist of the porous structures or network structures which consist of much stomata or micropores.
[0013] Moreover, in this invention, when vapor-depositing under a vacuum, it is desirable to vapor-deposit with the degree of vacuum which the boiling point of an organic compound becomes below decomposition temperature, and it is more desirable that the vapor pressure in 20 more degrees C is 1.3x102Pa or less, and the vapor pressure in 200 degrees C is 1.3x10 - 2 or more Pa. In these pressure regions, there is an advantage which can vapor-deposit metals, such as aluminum, within the same vacuum devices.
[0014] Moreover, the base material used in this invention is not limited that what is necessary is [especially] just conductivity or semi-conductivity, and can mention the thing which vapor-deposited the metal or/and the metallic oxide, or a metallic foil as a typical example to the tabular object which consists of macromolecules, such as high polymer films, such as polyester film, such as glass and polyethylene terephthalate, a polypropylene film, and a polyamide film, or polymethylmethacrylate, concretely.
[0015] Especially the thing for which a metal is first vapor-deposited to a high polymer film in the vacuum deposition inside of a plane, and the evaporation matter is subsequently vapor-deposited by using this vacuum evaporationo film as a base material by this vacuum deposition inside of a plane in this invention is desirable.
[0016] For example, after vapor-depositing the oil which contains unsaturated fatty acid, unsaturated fatty acid ester, or these in polyester film or a polypropylene film on the front face of a vacuum evaporationo metal membrane, using the metal vacuum evaporationo film which vapor-deposited aluminum as a base

material, gas barrier property and scratch-proof nature can be raised by carrying out the polymerization of this organic compound.

[0017] Hereafter, although this invention is explained more to a detail using drawing, this invention is not limited to these.

[0018] Although it is the schematic diagram of ** in order to explain an example of equipment suitable in order that drawing 1 may carry out this invention, this invention is not limited to this equipment. This equipment consists of fundamentally the vacuum wall 3, the evaporator 4 which has opening 5, the organic compound delivery tubing 6, a metering pump 7, the closing motion bulb 8, the spray rod 9 into which the ultrasonic vibrator was built, lead wire 10 and 15 for impressing an electrical potential difference, a power source 11, and a metal roll 14 for impressing an electrical potential difference to a base material 1. Furthermore, opening 5 consists of much micropores or the metal electrode plate 13 with network structure, an electric insulating plate 12 with which this electrode plate 13 and an evaporator 4 are insulated electrically, and narrow opening opening prepared in the evaporator 4. Respectively, connection is carried out to a power source 11 with lead wire 10 and 15, and, as for the electrode plate 13 and the metal roll 14, the electrical potential difference is impressed between the electrode plate 13 and the metal roll 14.

[0019] In the vacuum (side A) side, it is held at the vacuum and the base material 1 is running the cooling drum 2 top. [the vacuum wall 3] When a base material 1 contacts the metal roll 14, the electrical potential difference is impressed to the metal vacuum evaporationo film of base material 1 surface from the power source 11. In addition, the atmospheric-air (side B) side is in the condition put to atmospheric air. [the vacuum wall 3]

[0020] Degassing of the organic compound is carried out and the amount of conventions is sent into a spray rod 9 through the closing motion bulb 8 through the organic compound delivery tubing 6 by the metering pump 7 which can hold a vacuum from organic compound ****** (not shown) currently kept. The ultrasonic vibrator is built into the spray rod 9, and the organic compound having referred to the vibrator within spraying (horn) is sprayed to the wall of the evaporator 4 which became fog-like and was held by the supersonic vibration of vibrator at the elevated temperature (not shown [an ultrasonic power source and an ultrasonic vibration generator system] in drawing 1). The detail of an ultrasonic vibrator is not illustrated. . The sprayed organic compound evaporates at the same time it collides with the wall of the heated evaporator 4, and it is emitted to vacuum evaporationo inside-of-a-plane space through the opening 5 at the tip of an evaporator 4. at this time, since the electrical potential difference is ****(ed) by the electrode plate 13 and base material 1 of opening 5, the steam of an organic compound is charged, and it leads to the electric field between opening 5 and a base material 1 further -- having -- the front face of a base material 1 -- electrostatic force -- it adheres. Since the base material 1 is cooled on the cooling drum 2, the organic compound adhering to a base material 1 is condensed easily, and the thin film of an organic compound is formed in the front face of a base material 1. Moreover, since the organic compound adhering to a base material 1 has adhered in a base material 1 and electrostatic force, the probability which the adhering organic compound re-evaporates is low.

[0021] In addition, an electrical potential difference can also be directly impressed to an evaporator 4. It is desirable to make into network structure etc. whether to prepare much micropores in opening opening of an evaporator 4 at this time.

[0022] Although the electrical potential difference supplied from a power source 11 and a current may be any of a direct current, an alternating current, and the alternating current that superimposed the direct current, since an organic compound is a dielectric, generally its alternating current which superimposed the direct current is desirable. the polarity of the electrical potential difference applied to an electrode 10 -- opening 5 -- receiving -- positive/negative -- whichever is sufficient, and although it is dependent on the distance of a degree of vacuum and a base material 1, and an evaporator 4, about 50V to 10kV of an electrical potential difference is desirable at peak voltage. Less than [50V], there are few amounts of electrifications which an organic compound steam wears, and it becomes easy to diffuse the steam of an organic compound to vacuum evaporationo inside-of-a-plane space in addition to base material 1. Moreover, if 10kV is exceeded, arc discharge will become easy to break out between a base material 1, the metal components of the vacuum evaporationo inside of a plane and opening 5, or the metal roll 14, and the adhesion condition of an organic compound will become unstable. A more desirable electrical potential difference is 100V to 3kV.

[0023] The temperature of an evaporator 4 should just be heated beyond a wall and the temperature which in other words the vapor pressure of the vacuum evaporationo matter becomes [all inside fields] more than the pressure in an evaporator 4.

[0024] After vapor-depositing an organic compound on a base material front face using this invention furthermore, a more desirable property can be given to a base material by processing radiations, such as an electron ray, with an exposure or the low-temperature plasma in the vapor-deposited organic compound vacuum evaporationo layer, and promoting the reaction of an organic compound, or a polymerization.
[0025]
[Example] On a secondary extension polypropylene film with a thickness of 18 micrometers which performed corona discharge treatment, by the vacuum deposition inside of a plane exhausted to 5x10 to 3 Pa After vapor-depositing aluminum first so that it may become an absorbance OD 2.3, subsequently the equipment of drawing 1 is used. Opening in which the tung oil and the mixed oil (linolenic-acid content: 20 w/w%) of a linolenic acid which were made into the shape of a fog with the sprayer were supplied into the evaporator heated at 200 degrees C, and the mixed oil which evaporated was prepared by the evaporator was vapor-deposited on through and the vacuum-plating-of-aluminium film. The electrode plate of opening carried out the seal of approval of the electrical potential difference which superimposed peak voltage 300v and an alternating current with a frequency of 10kHz at direct-current 500v between the metal rolls arranged so that it may have 25 2 [/] cm and the vacuum-plating-of-aluminium film of a vacuum-plating-of-aluminium film may be contacted in a stoma with a diameter of 1mm.
[0026] Subsequently, it insulates from an earth electrode inside the earth electrode of the cube type which supplied the mixed gas (oxygen-gas concentration: 40-mol[/mol] %) of Ar gas and oxygen gas to the interior. The high-frequency voltage of peak voltage 600V was impressed to the installed high-voltage electrode, glow discharge (plasma) was formed in the earth electrode, it let the slit prepared in the earth electrode pass, a part of plasma was drawn, the mixed oil reservoir on the vacuum-plating-of-aluminium film was irradiated, and the mixed oil reservoir was made to construct a bridge. This actuation was performed on the 21000m polypropylene film by evaporation rate 500 m/min.
[0027] As a result of calculating the mixed oil quantity which adhered effectively on a base material from the thickness of the macromolecule resin layer which consists of a mixed oil with which the bridge was constructed on the vacuum-plating-of-aluminium film, the coating weight to the mixed oil quantity made to evaporate when an electrical potential difference was not impressed improved to 98% to having been 52%, when an electrical potential difference was impressed. Moreover, to the resin coat thin on the components of the vacuum evaporationo inside of a plane near the evaporator when an electrical potential difference is not impressed having been formed, when an electrical potential difference was impressed, formation of such a resin coat was not seen.
[0028]
[Effect of the Invention] This invention is the approach of impressing an electrical potential difference between the electrode plate which vacuum evaporationo matter, such as an organic compound, passes, and a base material, and making this evaporation matter vapor-depositing on a base material. By impressing an electrical potential difference to the electrode plate which the vacuum evaporationo matter which evaporated passes, the steam of the vacuum evaporationo matter is charged, it is guided to the electric field formed of the electrical potential difference further applied between the electrode plate and the base material, and the steam of the vacuum evaporationo matter adheres by the high ratio on a base material.
[0029] In this invention, the steam of the vacuum evaporationo matter has the still lower probability re-evaporated since it has adhered in a base material and electrostatic force.

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DRAWINGS

[Drawing 1]

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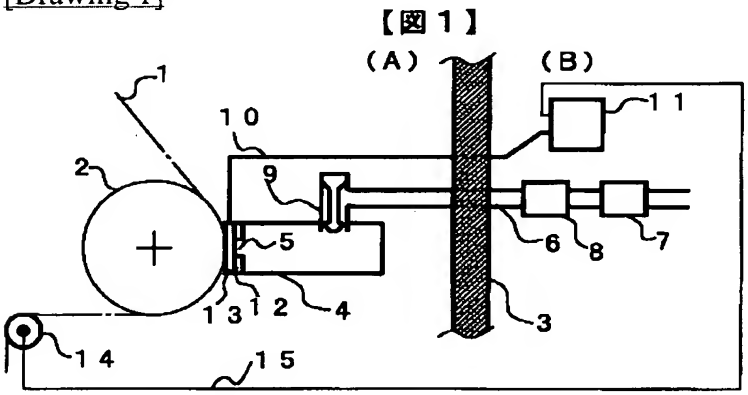

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